WHAT IS CLAIMED:

1. A method of determining whether a subject has, or is at risk of developing, a hematopoietic cancer associated with a reduction in wingless-related MMTV integration site 5a (Wnt5a) gene expression or activity or protein activity, the method comprising:

providing a biological sample comprising a test cell from the subject; and

determining the level of Wnt5a gene expression or activity or protein activity within the test cell,

wherein a reduction in the level of Wnt5a gene expression or activity or protein activity in the test cell, relative to that in a control cell, indicates that the subject has, or is at risk of developing, a hematopoietic cancer.

2. The method of claim 1, further comprising:

communicating the level of Wnt5a expression to a physician or other health care provider.

3. The method of claim 1, wherein the subject is a human patient.

4. The method of claim 1, wherein the hematopoietic cancer is selected from the group consisting of leukemia, lymphoma, and myeloma.

5. The method of claim 4, wherein the leukemia is acute leukemia or chronic leukemia.

6. The method of claim 5, wherein the acute leukemia is acute myeloid leukemia or acute lymphoblast leukemia.

7. The method of claim 5, wherein the lymphoma is selected from the group consisting of Hodgkin's and non-Hodgkin's Lymphoma.

8. The method of claim 7, wherein the non-Hodgkin's Lymphoma is selected from the group consisting of B cell lymphoma, Burkitt's lymphoma, diffuse cell lymphoma, follicular lymphoma, immunoblastic large cell lymphoma, lymphoblastic lymphoma, mantle cell lymphoma, mycosis fungoides, post-transplantation lymphoproliferative disorder, small non-cleaved cell lymphoma, and T-cell lymphoma.

9. The method of claim 1, wherein the test cell is a type of cell that becomes malignant in a hematopoietic cancer.

10. The method of claim 1, wherein one or both of the test cell or the control cell is a B cell, a T cell, an eosinophil, basophil, erythrocyte, neutrophil, granulocyte, or monocyte.

11. The method of claim 1, further comprising culturing one or both of the test cell and the control cell before determining the level of expression or activity of Wnt5a.

12. The method of claim 1, wherein determining the level of Wnt5a gene expression or activity, or protein expression or activity, comprises:

exposing mRNA isolated from the test cell to a Wnt5a-specific nucleic acid primer or probe; or

exposing protein isolated from the test cell to a Wnt5a-specific antibody.

13. A method of identifying an anti-hematopoietic cancer agent, the method comprising:

exposing a sample comprising a Wnt5a-expressing cell to a test agent; and

determining the level of Wnt5a gene expression or activity or protein expression or activity in the Wnt5a-expressing cell,

wherein an increase in Wnt5a gene expression or activity, or protein expression or activity, relative to the level of Wnt5a gene expression or activity, or protein expression or activity, in a control cell, indicates that the test agent is an anti-cancer agent.

14. The method of claim 13, wherein one or both of the Wnt5a-expressing cell and the control cell is a human cell.

15. The method of claim 13, wherein one or both of the Wnt5a-expressing cell and the control cell is a blood cell.

16. The method of claim 13, wherein one or both of the Wnt5a-expressing cell and the control cell is a lymphoid cell or a myeloid cell.

17. The method of claim 13, wherein the Wnt5a-expressing cell and/or the control cell is a B cell, a T cell, an eosinophil, a basophil, an erythrocyte, a neutrophil, a granulocyte, or a monocyte.

18. The method of claim 13, wherein the test agent comprises a polypeptide, a nucleic acid molecule, a small non-peptide, non-oligonucleotide molecule, or a chemical entity.

19. The method of claim 13, further comprising a step in which one or both of the Wnt5a-expressing cell and the control cell is cultured before determining the level of expression or activity of Wnt5a.

20. The method of claim 13, wherein determining the level of Wnt5a expression comprises (a) exposing Wnt5a mRNA from the test cell to a Wnt5a-specific nucleic acid primer or probe or (b) exposing Wnt5a protein to a Wnt5a-specific antibody.

21. The method of claim 13, wherein the level of Wnt5a activity is determined by assessing the level of expression of cyclin D1 and/or by assessing the extent of phosphorylation of protein kinase C (PKC), calmodulin kinase II (CamK II), dishevelled (dvl), or LEF-1.

22. The method of claim 13, wherein the level of Wnt5a activity is determined by assessing the level of expression of cyclin D1 and/or by assessing the extent of

phosphorylation of protein kinase C (PKC), calmodulin kinase II (CamK II), dishevelled (dvl), or LEF-1.

23. A method of treating a subject who has, or who is at risk of developing, a Wnt5a-associated hematopoietic cancer, the method comprising administering to the subject a nucleic acid molecule comprising a sequence that encodes Wnt5a or a biologically active fragment or mutant thereof, and, optionally, a sequence that encodes a detectable marker, wherein the amount of the nucleic acid molecule delivered is sufficient to generate a therapeutically effective amount of Wnt5a.

24. The method of claim 23, wherein the subject is a human patient.

25. The method of claim 23, wherein the nucleic acid molecule further comprises an expression vector.

26. The method of claim 23, wherein the nucleic acid molecule is delivered to the subject in connection with a liposome or liposomal complex.

27. The method of claim 23, wherein the Wnt5a-associated hematopoietic cancer is selected from the group consisting of leukemia, lymphoma, and myeloma.

28. The method of claim 27, wherein the leukemia is selected from the group consisting of acute leukemia and chronic leukemia.

29. The method of claim 28, wherein the acute leukemia is acute myeloid leukemia or acute lymphoblast leukemia.

30. The method of claim 27, wherein the lymphoma is selected from the group consisting of Hodgkin's and non-Hodgkin's Lymphoma.

31. The method of claim 30, wherein the non-Hodgkin's Lymphoma is selected from the group consisting of B cell lymphoma, Burkitt's lymphoma, diffuse cell lymphoma, follicular lymphoma, immunoblastic large cell lymphoma, lymphoblastic lymphoma, mantle cell lymphoma, mycosis fungoides, post-transplantation lymphoproliferative disorder, small non-cleaved cell lymphoma, and T-cell lymphoma.

32. The method of claim 23, wherein administering comprises:
removing a cell from the subject;
transducing the cell with a nucleic acid molecule comprising a sequence that encodes Wnt5a or a biologically active fragment or mutant thereof, and,
optionally, a sequence that encodes a detectable marker;
optionally culturing the cell; and
returning the cell to the subject.